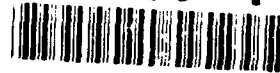# ◢◢Micrion

February 11, 1992

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Dr. Martin Peckerar
Naval Research Laboratories
Code 6804
4555 Overlook Drive, SW
Washington, DC 20375-5000

Dear Marty:

This is the 13th bimonthly report detailing work done on contract
N000-14-89-C-2238 during December 1991 and January 1992.

3.31 Advanced Column Development

We are assembling a completed advanced ion column for the 0.25 um
mask repair system including the appropriate harnesses and power
supplies. We have shipped several columns to the field for use on
the 9000(failure analysis) systems and they are working well.

We are evaluating the system layout to determine any mechanical
modifications necessary to mount the column on the 0.25 um system
without interference. Specifically minor mechanical changes are
being made to the variable aperture mechanism, the spacer between
the column and chamber lid, and to the bracket supporting the ion
pump which differentially pumps the column.

3.32 Repairs

Using a Hampshire X-ray mask we evaluated the edgelock analysis and
repaired defects using the analysis after the initial calibration.
The edgelock(or edgefinding) experiments were essentially the same
as those done on IBM masks and reported on at the December review
and in the last bimonthly report. The goal was to show that the
edgge analysis could be successfully adapted to a different edge,
reflective of either differences in absorber material or different
vendor's masks. Preliminary statistics show an accuracy about that
obtained from the evaluation of the IBM mask, ie. a standard
deviation of 0.02 um on a daily basis. Further the data was also
analyzed using the CD(critical dimension) software package
accompanying the FESEM acquired last year.

We tested the ability to locate the edge and place a repair by
repairing a number of actual defects on the Hampshire test mask,
including reconstruction of arrays of 0.45 and 0.35 um lines and
spaces. Although trimming redeposited material was necessary, the
SEM images were very good. Hampshire has agreed to test these
repairs by printing, using their Series 5000 Stepper.

We have begun preliminary (and informal) training of an outside
user of the 0.5 um repair tool. This interaction should be useful
for furhter process development.

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We began process development of clear defect repair for 0.25 um masks by trying to deposit gold, using the 0.5 um repair system. Specifically we will try to enhance the deposition yield with the existing electronics and column, and will note any deleterious interactions with gas sensing hardware such as thermocouple gauges and MCP's(microchannel plates) in case modifications are necessary to protect these devices.

3.33 System Stability
The vacuum chamber and cover, and plumbing assembly for the 0.25 um system have been assembled on the production floor: the isolators are being coupled to the system with a mechanical assembly that minimizes mechanical vibrations yet will prevent significant misalignment between the isolators and chamber during technical servicing.

Electrical vibrations are being minimized by routing the harnesses from the main chassis through a connector box and on to the system.

3.34 Electronics
Preliminary specifications for the digital high speed electronics, mainly the raster generator, are complete and specific designs are being evaluated.

Major work is being done to complete all harnesses necessary to complete integration of the 0.25 um system. They will be completed and on the system by the end of February as scheduled.

3.35 Software
We demonstrated transfer of defect data in Enhanced Mode I format from KLA and verified this by locating appropriate defects in the correct coordinate space. However, the field of view was twice as large as desired. This error is likely caused by the lack of a common coordinates system between the inspection and repair tools, and that KLA inspection data is from a print while Micrion repairs a mask. To correct this KLA is planning to transmit UVIS data in a three reference point system and Micrion is creating a coordinate lock.(rotation angle correction) compensation which will be imbedded in the defect data transfer program.

We will begin development of the vacuum controller software unique to the 0.25 um system in February. By this time, system components will be assembled to allow this level of software development. The program should be completed and tested to allow final integration of the system in April so process development can begin.

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Generally

Major components of the 0.25 um system have been assembled on the production floor and the remainder are being tracked. We do not anticipate any delays to our original schedule which calls for having an integrated and tested 0.25 um system ready for final repair process develop in April. Further, as mentioned, we have begun aspects of 0.25 um repair process development in parallel on the 0.5 um system.

Sincerely,

D. K. Stewart

Diane K. Stewart
X-ray Program Manager

DKS/mam

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NTIS CRA&I	✓	
DTIC TAB	☐	
Unannounced	☐	
Justification		
By per A 244252		
Distribution /		
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